

Ohio Space Grant Consortium  
Lead Institution: Ohio Aerospace Institute  
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Telephone Number: (513) 556-3223  
Consortium URL: <http://www.osgc.org/>  
Grant Number: NNX10AI39H

## **PROGRAM DESCRIPTION**

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Ohio Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2012.

## **PROGRAM GOALS**

The Ohio Space Grant Consortium has the following goals for FY2012 in support of the NASA Office of Education goals. The OSGC 5-Year Strategic Plan, Vision, Mission, Goals and SMART Objectives were redefined, approved and implemented by the OSGC Executive Committee in January, 2010.

**Goal 1** - To develop a STEM workforce in Ohio through a comprehensive scholarship and fellowship program at universities and colleges, through internships and educator development programs, and to increase workforce diversity by support of underrepresented groups in higher education to prepare individuals for employment in various NASA-related STEM careers.

**Specific:** The intent of the scholarship/fellowship programs is to increase the workforce in STEM areas, particularly with regard to female and underrepresented groups.

**Measurable:** For the combined scholarship/fellowship program our goal is to have 40% female<sup>1</sup> and 20% underrepresented students. 95% of undergraduate scholars will graduate, and 80% will enter STEM fields (education or workforce). 80% of Graduate fellows will graduate within 2 years of the end of the fellowship period and enter STEM fields. Award 1 special minority fellowship annually. Award 2 additional underrepresented scholarships at each OSGC MSI annually. Annually track students who

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<sup>1</sup>Percentage was changed from 50% to 40% to reflect the correct NASA target (November, 2011).

receive significant support through graduation, or until “the next step” via Exit Forms.  
*All of the aforementioned Specific and Measurable Objectives were met except our 40% female target. In 2012 our female scholarship fraction was reduced to 34.7% when we were unable to repeat our planned focused scholarship allocation.*

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3; NASA Outcome 2: 2.1, 2.3**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 2** - To support and integrate research and education for faculty and post-doctoral researchers within the State of Ohio through collaborations between universities and with NASA Centers, OSGC affiliates, the State of Ohio, the Ohio Aerospace Institute, the Air Force Research Laboratory, and STEM-related industry.

**Specific:** We will support seed grants for young faculty at Ohio universities and colleges to enable them to strongly compete for substantial national awards. We will specifically encourage proposals from underrepresented and female faculty.

**Measurable:** Each year, OSGC will support at least two seed grants for faculty. Within two years of the OSGC award, 50% of our awardees will leverage our support to a more substantial national funding.

*All of the aforementioned Specific and Measurable Objectives were met with the exception of awarding a research grant to a female faculty member.*

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 3** - To encourage the development of new courses and programs that will broaden the availability of STEM curriculum throughout the State of Ohio, especially in rural areas, at Minority Serving Institutions (MSIs) and community colleges, and strengthen existing STEM education programs at affiliate member’s schools through support for curriculum and course development.

**Specific:** OSGC will support course development in STEM areas of particular interest to NASA, particularly at those colleges and universities which are not dominant research institutions, and which serve mainly minority and rural populations. In some cases this will be best achieved by linking two or more schools together in a collaborative effort.

**Measurable:** Under current funding levels, we will fund at least two curriculum grants during the upcoming five-year cycle.

*All of the aforementioned Specific and Measurable Objectives were exceeded. A continuing curriculum grant was to an underrepresented male faculty at Wright State University and the other first-time community college curriculum grant was awarded to a male faculty member at Lorain County Community College.*

**Addresses NASA Outcome 1: Objectives 1.4, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

**Goal 4** - To promote hands-on student projects and activities primarily in higher education activities that will excite, inspire, and engage diverse student populations to become involved in STEM education, ultimately to be integrated into the NASA pipeline and STEM career paths.

Specific: We will fund student-oriented, hands-on projects at several schools within the OSGC network. Results of these projects will be disseminated to the OSGC affiliates, thus leveraging also with Goal 4.

Measurable: A minimum of two projects each year will be funded. At least one of these will be a collaborative effort between two or more schools, and at least one will be oriented toward a rocket or space project.

*All of the aforementioned Specific and Measurable Objectives were exceeded.*

**Addresses NASA Outcome 1: Objectives 1.2, 1.3, 1.5, 2.4**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 5** - To work within our affiliate network with a focus on Minority Serving Institutions (MSIs) and community colleges, to ensure that NASA and STEM opportunities are presented, encouraged, and awarded in accordance with respect for the diverse population of Ohio. *We are pleased to report that a community college student from FY2011 is now matriculated into a four-year Engineering program.*

Specific: We will strive to increase interest and activity within the Ohio MSIs and community colleges in STEM higher education and research activities by earmarking additional funding for student and faculty projects at these institutions.

Measurable: We will create and fund at least one student intern each year either at an MSI to work with a research faculty at an Ohio university. Community college scholarships will be specifically directed toward students who wish to matriculate to a higher education facility.

*All of the aforementioned Specific and Measurable Objectives were met. Two students have been selected as interns (one underrepresented male from Central State University (HBCU) and one underrepresented male from Wilberforce University (HBCU) to work with two identified research faculty members at The Ohio State University in Summer, 2013. Each student will receive a unique research experience in their chosen STEM field, but upon successful completion, each student's experience may likely lead to eventual enrollment in graduate school at the Ohio-based academic institution.*

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 6** - To encourage and promote K-12 student interest in pursuing higher education STEM curricula by supporting the development of qualified STEM educators through scholarships and workshops, and provide access to NASA educational materials.

**Specific:** OSGC will fund College of Education scholars who are interested in STEM careers in K-12 education, and connect them with NASA K-12 educational resources. We will encourage higher education schools with student-oriented projects to work with K-12 students to integrate them into aspects of these projects.

**Measurable:** We will fund a minimum of 12, \$1,000<sup>2</sup> scholarships each year, using an application process through the education departments at OSGC affiliates. Each scholar will be funded to attend a NASA-sponsored workshop, and given access to NASA educational materials.

*All of the aforementioned Specific and Measurable Objectives were exceeded – 15 pre-service teacher (Education) scholarships were awarded. Additionally, all awardees attended a mandatory workshop led by a NASA Aerospace Education Services Project (AESP) Specialist at the Ohio Aerospace Institute on February 15, 2013. A post-workshop evaluation was conducted, with 100 percent of the attendees' responses about the Workshop Content, Activities, and NASA materials were favorable on a 5-point scale ("Strongly Agree", "Agree", "Neutral", "Disagree", "Strongly Disagree", or "Not Applicable").*

**Addresses NASA Outcome 2: Objectives 2.1, 2.3, 2.4**

**Addresses NASA Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

**Goal 7** - To encourage the development and focus of outreach programs, courses, teacher professional development, and research projects that align with current areas of emphasis within NASA priorities, as well as the needs of the State of Ohio.

**Specific:** OSGC will interact and liaison with organizations such as museums, observatories, Greater Cleveland Partnership and others, working to improve the STEM educational opportunities of Ohio.

**Measurable:** We will fund organizations needing minor funding with "mini-grants" to promote their education and outreach activities. We will support other organizations and volunteer our time to promote their activity when consistent with OSGC spectrum of activities.

*All of the aforementioned Specific and Measurable Objectives were exceeded.*

**Addresses NASA Outcome 3: Objectives 3.1, 3.3**

**Addresses NASA Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

## **PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)**

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<sup>2</sup>Increased Education Scholarship awards to \$2,000 in FY2010.

### **Three Former Student Testimonials:**

•**Brian J. Stahl** was the recipient of an OSGC Master's Fellowship Award (FY2011) Brian received his Master's Degree in Aerospace Engineering from Case Western Reserve University in May, 2012. Brian is currently a Combustion Engineer with Fives North American Combustion in Cleveland, Ohio.

*"This fellowship made it possible for me to afford a graduate education – plain and simple. Without this award and the resultant completion of my Master's Degree, I would be worth considerably less to my chosen employer and would not have had the opportunity to make a meaningful contribution to our collective understanding of science through my graduate research project. I had access to NASA research facilities which no university, private or public, could afford individually. Particularly given the timing in cuts to other funding programs (i.e., GSRP), this award allowed for a graduate education in a STEM program and the addition of a highly educated engineer to Ohio's workforce."*

*Alignment to Outcomes 1 and 2.*

•**Stephanie D. Ash** was the recipient of both an OSGC Senior (FY2011) and Junior (FY2010) Scholarship Award. Stephanie received her B.S. in Physics from Ohio Northern University (ONU) in May, 2012, and is currently working on her Ph.D. in Physics from The Ohio State University. *"The NASA/Ohio Space Grant Consortium scholarship helped and shaped me in many ways. First, it allowed me to be able to afford going back to ONU my junior and senior year to conduct research there. If I had not had the scholarship, I would have had to transfer to a school which had less research opportunities. Second, the scholarship helped me to become a better researcher and taught me how to present the information that I found to a varying audience. I am so thankful for such a great opportunity."*

*Alignment to Outcome 1 and 2.*

•**Anna J. Gill** was the recipient of an OSGC Education Scholarship in FY2011 and received her B.S. in Education from Marietta College in May, 2012. Anna currently has a teaching position with the United Methodist Church in New York, New York. *"Thank you to the Ohio Space Grant Consortium for the opportunity to be a part of this program! I am very grateful for the educational materials that I received, as well as training in the many educational resources that NASA has to offer. These will be invaluable once I begin teaching. I want to also thank you for valuing the contribution of science and math teachers to STEM fields. Some people do not see us a "real scientists," but you all recognize the roles that teachers have in fostering skills and appreciation for science in our youth."*

*Alignment to Outcomes 1 and 2.*

**Outcome 1:** *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals: (Employ and Educate)*

**OSGC FY2012 goals were met.**

## **Fellowships and Scholarships**

OSGC's Fellowship and Scholarship Program provides financial support to students pursuing STEM degrees at OSGC member universities. The awards are competitive and are offered to U. S.' citizens. Underrepresented students, women, and persons with disabilities are especially encouraged to apply. A key feature of the program is an emphasis on exposure to research under the direction of a faculty mentor. All awardees are requested to present their research at the annual Student Research Symposium held every April at the Ohio Aerospace Institute (OSGC's lead institution) in Cleveland, Ohio. Fellowship recipients (Doctoral 1, 2, and 3 and Master's 1 and 2 Levels) and Senior scholarship recipients present oral presentations; Juniors and Community College scholarship recipients present posters, and Pre-service teacher (Education) scholars also present a poster of a future lesson plan incorporating NASA Education materials. All student awardees prepare written reports on their projects/lesson plans, which are published annually (in CD format) as *OSGC Symposium Proceedings*.

Scholarship and Fellowship applications, recommendation forms, and program flyers are advertised on the OSGC website and also on the OSGC Display housed at the Ohio Aerospace Institute. In addition, personalized campus posters and application packets are designed for each school and sent to each of the campus representatives for dissemination. Scholarship recipients are selected at each campus through a local selection committee. Fellowships are offered at member schools with a graduate program. Each school selects a maximum of 4 fellowship applications (any combination of Master's or Doctoral). All application packages are reviewed and evaluated by Executive Committee members using an OSGC-developed rubric. The rubric evaluation categories include: Academic Achievement, Recommendations and Research Background, Research, and Additional which includes: disadvantaged background, equity, non-academic achievement (community involvement). The scores are then tallied to determine the highest ranking fellow applicants in line for new awards. A special meeting/teleconference is convened to vote and approve all fellowship awardees.

Our home institution, the Ohio Aerospace Institute, also annually contributes directly and through solicited foundation and State funds, an additional \$105,000 for fellowships and scholarships.

**Graduate Fellowship awards include:** Doctoral 1, 2, and 3 and Master's 1 and 2 levels. The universities provide a cash cost share plus tuition waivers. Doctoral 1, 2, and 3 awards are \$20,000 (\$15,000 from OSGC; \$5,000 from university, plus tuition waivers). Graduate fellowships are renewable based on academic merit, approval of the student's advisor, and OSGC campus representative.

Master's 1 awards are \$16,000 (\$13,000 from OSGC; \$3,000 from university, plus tuition waivers). Master's fellowships are renewable for an additional six-month period. Master's 2 awards are \$8,000 (\$6,500 from OSGC; \$1,500 from university, plus tuition waivers).

In addition, a Special Minority Fellowship was established in FY2005 to be awarded to an underrepresented student studying for either a Doctoral or Master's Degree at an OSGC-member university with the same requirements and award amounts as noted above.

**Undergraduate STEM scholarship awards include:** Senior and Junior awards. The universities provide \$500 in cost sharing for each Senior and Junior scholarship award given. Seniors receive \$4,000 (\$3,500 from OSGC; \$500 from university). Juniors receive \$3,000 (\$2,500 from OSGC; \$500 from university). The Junior scholarship is renewable based on academic merit, approval of the student's advisor, and OSGC campus representative.

Pre-service Teacher (Education) scholarships are open to undergraduate or graduate students pursuing certification and licensure in a Science- or Mathematics-related discipline at an Ohio university through the College of Education. Students receive a \$2,000 scholarship award and are also required to attend a workshop where they receive exposure to NASA educational resources and lesson plans in collaboration with NASA Glenn Research Center Educational Programs Office, NASA Aerospace Education Services Project (AESP), and NASA CORE (Central Operation of Resources for Educators).

Community College awards are one-year \$1,000 awards (\$750 from OSGC; \$250 from community college).

Two special scholarships are also awarded to honor two former OSGC Directors who passed away to undergraduate students attending the Directors' home universities: 1) Kenneth J. De Witt Scholarship Award (\$1,000) is a tribute to OSGC's late Director at The University of Toledo to a deserving sophomore majoring in Chemical Engineering; 2) Paul C. K. Lam Scholarship Award (\$1,000) is in memory of OSGC's late Director at The University of Akron and is awarded to an underrepresented, undergraduate student majoring in Mechanical Engineering. In FY2012, the female recipient of the Kenneth De Witt award in FY2011 was selected to receive an OSGC Junior Scholarship in FY2012.

### **Fellowship and Scholarship Awards**

•In FY2012, OSGC has awarded a total of 95 combined scholarship and fellowship awards [9 graduate fellowships (including 1 special minority fellowship award), 86 undergraduate scholarships (including 32 Senior awards; 32 Junior awards; 5 community college awards; 15 pre-service teacher awards; and 2 awards honoring OSGC's two late Directors to undergraduate students attending at the Directors' home universities)]. Of the 95 awards, 26 were made to underrepresented minority students (27.37%), down very slightly (0.47%) from 27.84% in FY2011, and 33 awards to female students (34.74%), down from 46.39% in FY2011. The 11.65% reduction was due to the absence of Augmentation funding where planned additional Senior scholarship awards were to be reserved for women and underrepresented minorities. OSGC scholarship/fellowship awards to underrepresented minorities continue to exceed targets based on the State of Ohio percentage of 18.31%

(Source: Table 239<sup>3</sup>). All students who have received significant OSGC support and who have taken their “next step” have been successfully tracked.

- Continue to award Junior and Senior Scholarships to all OSGC member universities (64 awards in FY2012). OSGC’s two HBCUs (i.e., Central State University and Wilberforce University) receive one additional scholarship award for a total of 5 to each university.

- Continue to award Community College Scholarships to all OSGC member community colleges (5 awards in FY2012). For the first time, 3 community college scholarships were awarded at Sinclair Community College (a newly added community college affiliate in FY2011).

- Continue to award Pre-service Teacher (Education) Scholarships to all OSGC member universities with Colleges of Education (15 awards in FY2012).

- Continue to award the annual Kenneth J. De Witt Scholarship Award (tribute to OSGC’s late Director) at The University of Toledo to a deserving sophomore Chemical Engineering Student. The sixth scholarship was awarded to Mr. Kevin T. Garverick, Sophomore, majoring in Chemical Engineering.

- Continue to award the annual Paul C. K. Lam Scholarship Award (in memory of OSGC’s late Director) at The University of Akron, to an underrepresented, undergraduate student majoring in Mechanical Engineering. The fifth award was made to Ms. Lonnie M. Atkinson, Junior, majoring in Mechanical Engineering.

- A major accomplishment in this area is OSGC’s ability to sustain the annual cost-sharing for scholarship and fellowship awards (i.e., cash contribution for scholarships and fellowships from the lead institution and the academic affiliates). Ohio Aerospace Institute (lead institution) provides \$105,000 cash for scholarships and fellowships annually. Academic affiliates provide a \$500 cash match for each Junior and Senior scholarship award. For Fellowships, academic affiliates provide a cash match of \$5,000 each for Doctoral awards and \$3,000 for Master’s 1 and \$1,500 for Master’s 2 awards, plus tuition waivers. Community Colleges provide a \$250 cost share for each scholarship award. All students who receive OSGC scholarship or fellowship support are successfully tracked upon exiting the program (taking the “next step”) to comply with NASA’s reporting requirements and are also published in OSGC’s annual Congressional Book which details all OSGC scholarship and fellowship recipients (by the current 16 Ohio Congressional Districts) since the inception of the program.

## **Higher Education**

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<sup>3</sup>Table 239: Fall enrollment in degree-granting institutions, by race/ethnicity of student and state or jurisdiction: 2010. Source: U. S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Spring 2011, Enrollment component. (This table was prepared November 2011.)

Website URL: [http://nces.ed.gov/programs/digest/d11/tables/dt11\\_239.asp](http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp)



- Award seed grants for innovative STEM Higher Education programs at Ohio universities. Some representative titles include: “Spacecraft Design Rocket and Nanosat Projects” at the University of Cincinnati (Grant W. Schaffner); “Manufacturing Engineering Program Development and Its Potential Impact on Transforming Undergraduate Engineering Curriculum,” Wright State University - Lake Campus (P. Ruby Mawasha, (underrepresented male)); “Development of a Visual and Animation-Assisted Undergraduate Course: Design and Analysis of Mechanical Systems” at The University of Toledo (Yong X. Gan); “Development of a New Course in Aerospace Curriculum” at Lorain County Community College (Marlin Linger).
- OSGC continued support for the OhioSAT (Ohio State-wide Student-led Satellite Program) in collaboration with NASA Glenn Research Center, the Air Force Institute of Technology (AFIT), and the Ohio Aerospace Institute (OAI). In the current Phase 2 we are seeking to fund programs within the affiliates to perform specific tasks as identified in the AFIT workshop, and directed toward a specific payload. The program will involve collaboration with OSGC, OAI, NASA Glenn Research Center, AFIT, the Air Force Research Laboratory, and ultimately industry partners. Our intent is to fund two university teams for design and construction work during the upcoming academic year on the proposed satellite electronic module. The University of Dayton created a “*Student Satellite Club*” as the result of Ohio SAT project.
- All OSGC scholarship and fellowship recipients attended the 20th Annual OSGC Student Research Symposium on April 20, 2012, at the Ohio Aerospace Institute, in Cleveland, Ohio. All OSGC students present their research and are evaluated by university faculty, NASA engineers and scientists, and Ohio Aerospace Institute Senior Research Associates. Senior Scholars, Master’s, and Doctoral Fellows make oral presentations of their research project. Junior Scholars, and Community College Scholars prepare a poster illustrating their work during a formal poster session. Pre-Service Education Scholars also prepare a poster highlighting a future lesson plan that incorporates NASA educational materials. All students prepare written reports, which are bound and published as *OSGC Symposium Proceedings*. The luncheon keynote speaker was Dr. Gary L. Slater, Director, Ohio Space Grant Consortium. For the first time, OSGC recruited former scholarship recipients who are now Civil Servants at NASA Glenn Research Center as evaluators for the student presentations.
- Continue to support proposals from affiliate members for Diversity Initiatives which include: Funded 4 Fellowship awards to underrepresented students (2 females; 2 males) at the following Ohio member universities: Ohio University received funding for 1 Doctoral Fellowship (1 underrepresented female). The University of Dayton received funding for 2 Master’s Fellowships (1 underrepresented female; 1 underrepresented male, Special Minority Fellowship). The Ohio State University received funding for 1 Master’s Fellowship (1 underrepresented male).
- Plans are in place to fund two underrepresented students as interns (one underrepresented male from Central State University (HBCU) and one underrepresented male from Wilberforce University (HBCU) to work with two identified research faculty members at The Ohio State University in Summer, 2013. Each student will receive a unique research experience in their chosen STEM field, but upon successful completion, each student’s experience may likely lead to eventual enrollment in graduate school at the Ohio-based academic institution.

- OSGC provided funding to support 2 students (1 underrepresented male) to participate in the NASA Academy and for travel during Summer, 2012:
  - Nathaniel J. Morris, (underrepresented male), NASA Aeronautics Academy at Glenn Research Center
  - Dennis J. Siedlack, NASA Aeronautics Academy at Glenn Research Center
- OSGC provided funding to support 5 internships and for travel (1 female) at NASA Centers and with industry during Summer, 2012:
  - Internship at NASA Marshall Space Flight Center, Andrew K. DeSomma
  - Internship at NASA Ames Research Center, Eric Lee Moyer
  - Internship at NASA Langley Research Center, Alec J. Weisman
  - Industry Internship at Cornerstone Research Group, Kristen G. Crum (female)
  - Industry Internship at Orbital Research Group, Inc., Kevin J. Pataki
- OSGC provided funding to support 1 internship and for travel for AnaPatricia Marquez (underrepresented female) at NASA Johnson Space Center during Spring, 2013.
- Provided support for Cleveland State University students to assist with the “Cleveland VEX Robotics Competition” held at Cleveland State University on February 1, 2013.
- Supported “Engineering Week” at Case Western Reserve University in Cleveland, Ohio (week of February 14, 2013).
- Supported “National Engineers Week” at Miami University. NASA Glenn Research Center Director, Jim Free, spoke to the group on February 19, 2013, on the “Future of Space Exploration.” Note that Mr. Free is a graduate of Miami University.
- Provided support for 5 faculty and 4 students from Central State University (HBCU) to attend the annual “Advanced Energy Conference and Exposition” held at The Ohio State University, Columbus, Ohio (October 30-31, 2012).
- Provided support for the Student Satellite Club at the University of Dayton (John G. Weber).
- Provided support for Cleveland State University students to assist with the “Engineer for a Day Program” orientation held in Cleveland, Ohio (February 9, 2013).
- Provided support for Miami University “Project High Flight” students to assist with the “STEM Exploration Academy” activities held in Oxford, Ohio (April 9, 2013).
- Provided travel for 12 Education students at Cedarville University to attend the Science Education Council of Ohio (SECO) Conference “Framing Effective Teaching in Science” held in Dayton, Ohio (February 7-9, 2013).
- Provided travel support for 6 Education students at Cedarville University to attend the National Science Teacher Association (NSTA) Conference held in Indianapolis, Indiana (March 29–April 1, 2012).
- Provided travel support for 1 faculty member and 4 students from Case Western Reserve University to attend the ASME’s “10th International Conference on Nanochannels, Microchannels, and Minichannels” in Rio Grande, Puerto Rico (July 8-12, 2012).
- Provided travel support for scholarship and fellowship recipients to attend the Annual OSGC Student Research Symposium held at OAI on April 20, 2012.
- Provided travel support for Education scholarship recipients to attend the NASA Pre-Service Teacher Workshop was held at OAI on February 15, 2013.

***Student-Innovative-Creative-Hands-on Project (SICHOP) Higher Education Grants:***

- Provided support for the “Rocket Team at the University of Cincinnati (UC)” (Grant W. Schaffner, Advisor). The UC team competed in the Regional Space Grant Consortia Rocket Competition in Milwaukee, Wisconsin (April 27-28, 2012), and took first place honors in the Engineering category. The competition is a joint Consortia effort with the Great Midwest Space Grant Consortia spearheaded by the Wisconsin Space Grant Consortium. Plans are to support the team again in the 2013 competition.
- Provided support for the “Rocket Competition Program,” at Lorain County Community College (LCCC), (Marlin Linger, Advisor). The LCCC team also competed in the Regional Space Grant Consortia Rocket Competition in Milwaukee, Wisconsin (April 27-28, 2012), and took first place honors in the Non-Engineering category. The competition is a joint Consortia effort with the Great Midwest Space Grant Consortia spearheaded by the Wisconsin Space Grant Consortium. Plans are to support the team again in the 2013 competition.
- Provided support to Ohio University for “Accuracy of a New Mechanical Response Tissue Analysis (MRTA) Device” (Patricia Arnold).
- Provided support to Case Western Reserve University for “Proposed High Altitude Microgravity Experiment (PHAME)” (Dennis J. Siedlack and Jaikrishnan R. Kadambi). Provided support to The University of Akron for “Radio Frequency-Powered Wireless Sensor Network” (Courtney Gras).
- Provided support to the University of Cincinnati Aircraft Design Team for the design of a transport type airplane with the goal of lifting the most weight possible (John W. Livingston).
- Provided support for 2 student NASA Lunabotics Competition teams at: 1) The University of Akron (Thomas T. Hartley); Miami University (Harry A. Pierson).
- Supported Miami University team of 33 students (12 females; 21 males; 3 underrepresented) for “Project High Flight” (Robert J. Setlock).
- Provided travel support for 3 University of Cincinnati students to present their research entitled: Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA)” at the 2013 National Space Grant Directors’ Spring Meeting in Crystal City, Virginia. This was the first time Ohio students were featured at a National Space Grant meeting.
- Supported students from Case Western Reserve University and Cleveland State University who participated in “NASA’s Technology Days” in Cleveland, Ohio (November 28–30, 2012). This three-day event and technology showcase will bring together a broad community of stakeholders from industry, academia, and the U.S. government to engage in strategy development, partnership building, and implementation of ways to foster technology transfer and innovation.
- Continue to support student-led balloon satellite/rocketry programs at: Central State University (HBCU), The University of Akron, University of Cincinnati, and Wright State University. Miami University received an OSGC grant for Project High Flight led by Professor Robert Setlock. The LCCC received an OSGC grant to form a Rocket Team led by Professor Marlin Linger to construct a rocket and be ready to compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, Wisconsin (April 27, 2013). The University of Cincinnati Rocket team will also compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, Wisconsin (April 27, 2013).

### ***Senior Design Courses***

Provided support for 8 senior design courses at Ohio universities/community college (i.e., Lorain County Community College, Miami University, The University of Toledo, and Wright State University):

- OSGC funded "Project High Flight" at Miami University (Robert J. Setlock, Principal Investigator). An experimental new course was developed (EAS 144) in Spring, 2012, and will be continued as the following two permanent courses in Spring, 2013:

- 1) EAS 130a (Engineering and Creativity – Project High Flight) - This course will guide students through the creative process of developing original ideas into concepts, and then developing those concepts into designs. Students will explore creativity both as an abstract concept and a personal trait. Students will be introduced to the notions of divergent and convergent thinking, how the two differ, and how divergent thinking is necessary for creativity. Students will then be introduced to the Engineering Design Process as a systematic approach to problem solving that is applicable to a wide variety of different kinds of problems, and explore how both divergent and convergent thinking skills are needed to do it well. While development and utilization of emerging technologies is a feature of this course, it is the creative process and related thinking skills that will be the primary focus. Students of all disciplines are encouraged to enroll.

- 2) EAS 230a (Foundation – Project High Flight) - This course will build on ideas and concepts introduced in EAS 130a. Students will learn to apply the Engineering Design Process to develop novel ideas into working prototypes. Students will focus on developing the interpersonal skills needed to supervise a team successfully. Students will take turns supervising various teams throughout the academic year to gain experience. Students will also learn how to use the peer evaluation process as tool for resolving potential conflicts before they become serious problems. They will also learn how to use peer evaluations to assess their team member's performance. While development and utilization of emerging technologies is a feature of this course, it is the creative process and the skills necessary for team supervision that will be the primary focus of this class.

EAS 330 and EAS 430 will added in the coming years as the students advance. EAS 144, which is intended to be the first part in a four year series of courses designed to serve as the organizational focal point for executing Project High Flight. Project High Flight and EAS 144 taken together form the catalyst of a coordinated effort to improve the level of creativity and innovation in engineering students by developing within them an improved appreciation for, and capacity to effectively use, their divergent thinking skills. This is all being accomplished in the context of researching and developing an operational capability to fly and remotely control long duration high altitude balloon missions to the edge of space. Date of implementation: Spring, 2012. A new website was also created at Miami University as a result of OSGC funding: <http://projecthighflight.org>

- OSGC funded Dr. Yong X. Gan, Principal Investigator (PI), on his project entitled: "Development of a Visual and Animation-Assisted Undergraduate Course: Design and Analysis of Mechanical Systems," at The University of Toledo. The following two courses were revised and implemented in Fall, 2012: MIME 3300-001, MIME 3300-002, "Design and Analysis of Mechanical Systems" – the objective of this course is to teach students the fundamentals of mechanical systems, and methods for identifying,

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model rockets. This was the first time OSGC supported a curriculum grant at a community college.

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Award seed grants for innovative STEM Research Infrastructure programs at Ohio universities. Some representative titles include: “UC BEARSat Nanosatellite Development for Air Force Nanosat-8 Competition,” University of Cincinnati (Grant W. Schaffner); “Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA),” at the University of Cincinnati (Kelly Cohen); “Nuclear Power for Space Colonization Research and Technology Development, Phase II (Ralph Steckler Project) at The Ohio State University (Thomas E. Blue) and Wilberforce University (HBCU) (Edward Asikele) (underrepresented male).

•Ohio’s two HBCUs (Wilberforce University and Central State University) collaborated for student/research faculty opportunities at three facilities: 1) The Ohio State University Nuclear Laboratory (Columbus, Ohio); 2) Babcock & Wilcox (Portsmouth, Ohio); 3) Femi Nuclear Power Plant (Monroe, Michigan). Two faculty members (both underrepresented males) and six students (all underrepresented – 4 male, 2 female) participated. During the each of the visits to the research laboratories, students and faculty members toured the facilities and also conducted experiments on radiation of sample materials, cooling pools, and theoretical aspects of nuclear reactions. The students collected data for the sample radiation and power generation, then performed the analysis of the data and finalized reports. As a result, Wilberforce University and Babcock & Wilcox have signed a Memorandum of Understanding (MOU). The MOU provides for student internships, cooperative education, and employment opportunities for students, seminars/lectures/workshops at Wilberforce University by B&W staff. There is also a future opportunity for research collaboration.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage)*  
**OSGC FY2012 goals were met.**

### **Precollege Programs**

•Award mini-grants to Ohio K-12 teachers for innovative STEM programs. Representative titles include: “Return to the Moon,” Bishop John King Mussio Elementary (BJKM) (Susan R. Crites); “NASA Student Launch Initiative,” St. Vincent-St. Mary High School, (Robert J. Engels); “Lake Campus Engineering and High School roBOTicS Collaborative Project,” Wright State University - Lake Campus and Thurgood Marshall High School (P. Ruby Mawasha); “Dayton's Best Students,” Dayton Public Schools (Cassie Lee Marshall); “All-American Soap Box Derby Gravity Race Challenge,” North Canton Middle School (Todd D. Alkire); “Math Game Group (MGG),” Lake Ridge Academy (Wade L. Zwinger); “Mission to Mars/Science Olympiad,” St. Pius X School (E. Catherine Ujvagi).

•Awarded mini-grant to Mr. James M. Less, Science Teacher, Bettsville Local Schools, for his project entitled: “Exploring Science in the Real World”. Note that Mr. Less is a former OSGC Education scholarship recipient (FY2010 and FY2009).

- OSGC offered a pre-service teacher workshop in collaboration with NASA Glenn Research Center Educational Programs Office (EPO), NASA Aerospace Education Services Project (AESP), and NASA CORE (Central Operation of Resources for Educators) for OSGC education scholars and classroom teachers. Participants received NASA education materials, professional development opportunities, curriculum modules for classroom use, and local resources for enhancing classroom teaching and student experiences in the classroom. Students also had an opportunity participate in hands-on educational activities that can be replicated into a future lesson plan under the guidance of a NASA Aerospace Education Specialist, Susan M. Kohler. The workshop was held at OAI on February 15, 2013. A post-workshop evaluation was conducted, with 100 percent of the attendees' responses were rated favorably about the Workshop's Content, Activities, and NASA materials on a 5-point scale ("Strongly Agree", "Agree", "Neutral", "Disagree", "Strongly Disagree", or "Not Applicable"). Additional comments include: *"The content of the workshop was useful; I am satisfied with this workshop; Activities and materials apply to my major; By participating, I have a better understanding of NASA programs/resources available; I plan to use the materials in a future lesson plan for my class; This workshop will help me develop my lesson plan for the Symposium."*
- Provided support for "Flight Camp at the University of Cincinnati for High School/Middle School" (Kelly Cohen) to provide an intensive exposure of aerospace, science, and engineering activities to urban middle and high school students as part of a STEM program aimed at opening opportunities for non-traditional students in the STEM fields who would not otherwise have access to in-depth courses of study, and careers for which they have the abilities, but little information or firsthand knowledge.
- Provided support for Ohio Northern University's Engineering Pathways Camp where high schools students spend 5 days on campus experiencing a variety of engineering activities led by Ohio Northern faculty in Ada, Ohio (June 17-22, 2012).
- Provided support for Miami University students to assist with the annual "Miami/Talawanda Science Week" activities held in Oxford, Ohio (Week of May 14-18, 2012).
- Cedarville University (Robert Chasnov) hosted a pre-service teacher workshop for all Education and Science majors. Highlight of the annual program is a presentation by Bill Richey, Science Teacher at Xenia High School (also adjunct professor at Miami University) and Ohio Teacher of the Year along with other national teaching awards.
- Sponsorship of the FIRST Buckeye Regional Robotics Competition – 59 high school teams (Ohio has 29 teams – 56 percent) with over 1,300 students from across the country competed in a robotics competition that combines sports with engineering and technology held at Cleveland State University Wolstein Center (March 28-30, 2013). [OSGC receives favorable publicity as a sponsor to this event (i.e., websites, signage, banners, and ads in Ohio newspapers.)] (URL: <http://oai.org/firstbuckeye/>)
- Provided travel support for iSPACE personnel, Beverly Ketron (female), Education Director; to present and attend the 2012 Space Exploration Educators Conference (SEEC) at NASA Johnson Space Center for teacher professional development.
- Provided support for Ohio Northern University students and faculty to visit 3 middle schools in Ada, Ohio, to involve Grades 4, 5, and 6 in engineering activities.

**Outcome 3:** *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire). OSGC FY2012 goals were met.*

### **Informal Education**

•Participated in Ohio Aerospace Day in Columbus, Ohio (June 6, 2012). Former OSGC student Robert Charvat testified to the Ohio Senate Committee about his experiences in aerospace and indicated how his participation in the Ohio Space Grant Consortium Program help him to garner a position in the aerospace industry as an Engineer with GE Aviation in Evandale, Ohio. Part of Rob's closing testimony: *"I wanted to tell a story to try to give everyone something to think about as we continue on towards lunch. Some of you may be familiar with it so I will keep it brief. I was told a story about two brothers who owned a repair shop, it wasn't a big shop, but big enough. It wasn't that big because what they used this repair shop for was to fund a 'bad' hobby they had. Now, this hobby was dangerous, one of them would eventually die from it. It was different; it had never been done before. Lastly, it was expensive; they spent significant amounts of money on it, at a time when jobs were scarce, and money was valuable. And because of these things people called them stupid and crazy ... and they were notorious. I tell you this story because it reminds me of aerospace today. Aerospace is probably one of the most unnatural things humans have learned to do. It is dangerous, expensive, and much different than anything humans had ever attempted before. But without it, our world would not be the same; aerospace defines us. We watched it step or roll into new places, we type on it every day, and we sit in our cars with our families and watch it fly over ... But back to the story about those two brothers. Those brothers were the Wright brothers, and are the reason we are here today. They set the standard for aerospace in Ohio, and remind us of where we come from, and where we should be going. So next time you see someone in aerospace doing something dangerous, expensive, and different, remember that today they are trouble makers, tomorrow they are revolutionaries. In the meantime, let's keep that opportunity in Ohio, and next time you see a young aerospace engineer doing something stupid, encourage it, because today they are trouble, tomorrow they are changing the world."*

•Sponsorship of "Science is Fun!" family days at Case Western Reserve University (Kathryn M. Kwiatkowski).

•Supported the 2012 Women in Engineering Camp at the University of Dayton (July 8-13, 2012) – a week-long, residential summer program that introduces high school females to career opportunities in engineering through classroom activities, hands-on experiments, industry visits, and exposure to engineers as role models.

•Sponsorship of "Science Olympiad" at Case Western Reserve University (Kathryn M. Kwiatkowski).

•Provided support for Ohio Northern University's Camp GEMS (Girls in Engineering, Math and Science) a 4-day campus experience for Grade 7 and 8 females to participate in Science, Engineering, and Math experiments led by Ohio Northern Engineering faculty and students. The camp is held on campus in Ada, Ohio (July 15-18, 2012).

•Awarded grant to the Cincinnati Observatory for "Astro Thursdays".

•Cleveland Museum of African American History – permanent home of the "African Americans in Space Science Exhibit".



- Drake Science Center in Cincinnati – conducts structured visits for teachers, students, and parents (over 20K students annually) in astronomy topics.

## **PROGRAM ACCOMPLISHMENTS**

The majority of OSGC programs include Scholarships and Fellowships (with required research component with faculty mentor), Higher Education projects (through Curriculum Innovation Proposal (CIP) / Faculty Research Initiation Grant Proposal (FRIGP) / Student-Innovative-Creative-Hands-on Project (SICHOP) grants), Research Infrastructure projects (Faculty Research Initiation Grant Proposal (FRIGP) grants), Precollege (teacher training thrust and mini-grant program), Informal Education projects (Informal Education Innovation Proposal (IEIP) grants).

**Outcome 1:** *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals: (Employ and Educate)*

**The following OSGC FY2012 Goals were met or exceeded (Goals 1-5).**

**Goal 1** - To develop a STEM workforce in Ohio through a comprehensive scholarship and fellowship program at universities and colleges, through internships and educator development programs, and to increase workforce diversity by support of underrepresented groups in higher education to prepare individuals for employment in various NASA-related STEM careers.

*All of the aforementioned Specific and Measurable Objectives were met except our 40% female target. In 2012 our female scholarship fraction was reduced to 34.7% when we were unable to repeat our planned focused scholarship allocation.*

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3; NASA Outcome 2: 2.1, 2.3**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 2** - To support and integrate research and education for faculty and post-doctoral researchers within the State of Ohio through collaborations between universities and with NASA Centers, OSGC affiliates, the State of Ohio, the Ohio Aerospace Institute, the Air Force Research Laboratory, and STEM-related industry.

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 3** - To encourage the development of new courses and programs that will broaden the availability of STEM curriculum throughout the State of Ohio, especially in rural areas, at Minority Serving Institutions (MSIs) and community colleges, and strengthen existing STEM education programs at affiliate member's schools through support for curriculum and course development.

**Addresses NASA Outcome 1: Objectives 1.4, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

**Goal 4** - To promote hands-on student projects and activities primarily in higher education activities that will excite, inspire, and engage diverse student populations to become involved in STEM education, ultimately to be integrated into the NASA pipeline and STEM career paths.

**Addresses NASA Outcome 1: Objectives 1.2, 1.3, 1.5, 2.4**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

**Goal 5** - To work within our affiliate network with a focus on Minority Serving Institutions (MSIs) and community colleges, to ensure that NASA and STEM opportunities are presented, encouraged, and awarded in accordance with respect for the diverse population of Ohio. *We are pleased to report that a community college student from FY2011 is now matriculated into a four-year Engineering program.*

**Addresses NASA Outcome 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5**

**Addresses NASA Strategic Goal 5, Outcome 5.1, Objective 5.1.2; Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1**

In FY2012, the OSGC provided support for **117 student awards** (breakdown is as follows):

#### **Fellowship/Scholarships**

- Awarded 95 Scholarships and Fellowships

#### **Higher Education**

- Provided support for 13 student participants in Higher Education programs.

#### **Research Infrastructure**

- Provided support for 9 student participants in Research Infrastructure programs.

#### **Achievements and Progress**

#### **Fellowship/Scholarships**

- Awarded 95 Scholarships and Fellowships:
  - 64 STEM undergraduate scholarships (32 Seniors; 32 Juniors)
  - 5 Community College scholarships
  - 15 Pre-service Teacher scholarships
  - 2 Special scholarships (honoring two late OSGC Directors at their home universities)
  - 9 Graduate Fellowships (5 Doctoral; 4 Master's – includes 1 new special minority award)
- Of the 95 awards, 26 were made to underrepresented students (27.317%).
- Of the 95 awards, 33 were made to female students (34.74%).
- Twentieth Annual Student Research Symposium was held at the Ohio Aerospace Institute in April 20, 2012, with over 150 attendees.

#### **Higher Education**

Supported 13 Higher Education students as interns (industry or NASA Centers), participants in NASA Academy, or as part of the OSGC Higher Education grant program.

- Provided support for 5 internships/travel (1 female) in Summer, 2012 [3 at NASA Centers (Ames, Langley, and Marshall); 2 with industry (Cornerstone Research Group and Orbital Research Group, Inc.)].
- Provided support for 2 participants/travel (1 underrepresented male) in NASA Aeronautics Academy at Glenn Research Center in Summer, 2012.

- Provided support for 1 internship/travel (underrepresented female) in Spring, 2013, at NASA Johnson Space Flight Center.

- Provided support for 4 innovative STEM Higher Education programs at Ohio member universities.

1. “Spacecraft Design Rocket and Nanosat Projects,” University of Cincinnati (Grant W. Schaffner).
2. “Manufacturing Engineering Program Development and Its Potential Impact on Transforming Undergraduate Engineering Curriculum,” Wright State University - Lake Campus (P. Ruby Mawasha) (underrepresented male).
3. “Development of a Visual and Animation-Assisted Undergraduate Course: Design and Analysis of Mechanical Systems” at The University of Toledo (Yong X. Gan).
4. “Development of a New Course in Aerospace Curriculum” at Lorain County Community College (Marlin Linger). First grant in this area at the community college level.

- OSGC continued support for the OhioSAT (Ohio State-wide Student-led Satellite Program) in collaboration with NASA Glenn Research Center, the Air Force Institute of Technology (AFIT), Air Force Research Laboratory, and OAI.

- Continue to support proposals from affiliate members for Diversity Initiatives which include: Support was received to fund 4 Fellowships to underrepresented students (2 females; 2 males) at the following Ohio member universities: Ohio University received funding for 1 Doctoral Fellowship (1 underrepresented female). The University of Dayton received funding for 2 Master’s Fellowship (1 underrepresented female; 1 underrepresented male—Special Minority Fellowship). The Ohio State University received funding for 1 Master’s Fellowship (1 underrepresented male).

- Provided support for 9 innovative student-led, hands-on student experiences in STEM disciplines at Ohio universities (Student-Innovative-Creative-Hands-on Project (SICHOP) Higher Education Grants):

1. Rocket Team at the University of Cincinnati (UC) (Grant Schaffner).
2. Rocket Competition Program at Lorain County Community College (LCCC), (Marlin Linger).
3. University of Cincinnati Aircraft Design Team (John W. Livingston).
4. Lunabotics Competition team at The University of Akron (Thomas T. Hartley).
5. Lunabotics Competition team at Miami University (Harry A. Pierson).
6. Project High Flight at Miami University (Robert J. Setlock).
7. Accuracy of a New Mechanical Response Tissue Analysis (MRTA) Device at Ohio University (Patricia Arnold).
8. Proposed High Altitude Microgravity Experiment (PHAME) at Case Western Reserve University (Jaikrishnan R. Kadambi)
9. Radio Frequency-Powered Wireless Sensor Network (Courtney Gras).

**Other Higher Education Program support includes:**

- Provided travel support for 3 University of Cincinnati students to present their research entitled: Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA)” at the 2013 National Space Grant Directors’ Spring Meeting in Crystal City, Virginia. This was the first time Ohio students were featured at a National Space Grant meeting.
- Supported students from Case Western Reserve University and Cleveland State University who participated in “NASA’s Technology Days” in Cleveland, Ohio (November 28–30, 2012). This three-day event and technology showcase will bring together a broad community of stakeholders from industry, academia, and the U.S. government to engage in strategy development, partnership building, and implementation of ways to foster technology transfer and innovation.
- Continue to support student-led balloon satellite/rocketry programs at: Central State University (HBCU), The University of Akron, University of Cincinnati, and Wright State University. Miami University received an OSGC grant for Project High Flight led by Professor Robert Setlock. The LCCC received an OSGC grant to form a Rocket Team led by Professor Marlin Linger to construct a rocket and be ready to compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, WI (April 27, 2013). The University of Cincinnati Rocket team will also compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, WI (April 27, 2013).
- Supported “Engineering Week” at Case Western Reserve University.
- Supported “National Engineers Week” at Miami University. NASA Glenn Research Center Director, Jim Free, spoke to the group on February 19, 2013, on the “Future of Space Exploration.” Note that Mr. Free is a graduate of Miami University.
- Plans are in place to fund two underrepresented students as interns (one underrepresented male from Central State University (HBCU) and one underrepresented male from Wilberforce University (HBCU) to work with two identified research faculty members at The Ohio State University in Summer, 2013. Each student will receive a unique research experience in their chosen STEM field, but upon successful completion, each student’s experience may likely lead to eventual enrollment in graduate school at the Ohio-based academic institution.
- Provided support for Cleveland State University students to assist with the “Cleveland VEX Robotics Competition” held at Cleveland State University on February 1, 2013.
- Provided support for 5 faculty and 4 students from Central State University (HBCU) to attend the annual “Advanced Energy Conference and Exposition” held at The Ohio State University in Columbus, Ohio (October 30, 21, 2012).
- Provided support for the Student Satellite Club at the University of Dayton (John G. Weber).
- Provided support for Cleveland State University students to assist with the “Engineer for a Day Program” orientation held in Cleveland, Ohio (February 9, 2013).
- Provided support for Miami University “Project High Flight” students to assist with the “STEM Exploration Academy” activities held in Oxford, Ohio (April 9, 2013).
- Provided travel for 12 Education students at Cedarville University to attend the Science Education Council of Ohio (SECO) Conference “Framing Effective Teaching in Science” held in Dayton, Ohio (February 7-9, 2013).

- Provided travel support for 6 Education students at Cedarville University to attend the National Science Teacher Association (NSTA) Conference held in Indianapolis, Indiana (March 29–April 1, 2012).
- Provided travel support for 1 faculty member and 4 students from Case Western Reserve University to attend the ASME’s “10th International Conference on Nanochannels, Microchannels, and Minichannels” in Rio Grande, Puerto Rico (July 8-12, 2012).
- Provided travel support for Education scholarship recipients to attend the NASA Pre-Service Teacher Workshop was held at OAI on February 15, 2013.
- Provided travel support for scholarship and fellowship recipients to attend the Annual OSGC Student Research Symposium held at OAI on April 20, 2012.

Provided support for 8 senior design courses at Ohio universities/community college (i.e., Lorain County Community College, Miami University, The University of Toledo, and Wright State University).

• OSGC funded "Project High Flight" at Miami University (Robert J. Setlock, Principal Investigator). An experimental new course was developed (EAS 144) in Spring, 2012, and will be continued as the following two permanent courses in Spring, 2013:

- 1) EAS 130a (Engineering and Creativity – Project High Flight) - This course will guide students through the creative process of developing original ideas into concepts, and then developing those concepts into designs. Students will explore creativity both as an abstract concept and a personal trait. Students will be introduced to the notions of divergent and convergent thinking, how the two differ, and how divergent thinking is necessary for creativity. Students will then be introduced to the Engineering Design Process as a systematic approach to problem solving that is applicable to a wide variety of different kinds of problems, and explore how both divergent and convergent thinking skills are needed to do it well. While development and utilization of emerging technologies is a feature of this course, it is the creative process and related thinking skills that will be the primary focus. Students of all disciplines are encouraged to enroll.
- 2) EAS 230a (Foundation – Project High Flight) - This course will build on ideas and concepts introduced in EAS 130a. Students will learn to apply the Engineering Design Process to develop novel ideas into working prototypes. Students will focus on developing the interpersonal skills needed to supervise a team successfully. Students will take turns supervising various teams throughout the academic year to gain experience. Students will also learn how to use the peer evaluation process as tool for resolving potential conflicts before they become serious problems. They will also learn how to use peer evaluations to assess their team member’s performance. While development and utilization of emerging technologies is a feature of this course, it is the creative process and the skills necessary for team supervision that will be the primary focus of this class.

EAS 330 and EAS 430 will added in the coming years as the students advance. EAS 144, which is intended to be the first part in a four year series of courses designed to serve as the organizational focal point for executing Project High Flight. Project High Flight and EAS 144 taken together form the catalyst of a coordinated effort to improve the level of creativity and innovation in engineering students by developing within them an improved appreciation for, and capacity to effectively use, their divergent thinking skills. This is all being accomplished in the context of researching and developing an operational capability to fly and remotely control long duration high altitude balloon missions to the

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### **Research Infrastructure**

Provided support for 3 innovative STEM Research Infrastructure programs at Ohio member universities.

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2. “Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA),” at the University of Cincinnati (Kelly Cohen).
3. “Nuclear Power for Space Colonization Research and Technology Development, Phase II (Ralph Steckler Project)” at The Ohio State University (Thomas E. Blue) and Wilberforce University (Minority Serving Institution) (Edward Asikele) (underrepresented male).

### **Other Research Infrastructure Program support includes:**

- Ohio’s two HBCUs (Wilberforce University and Central State University) collaborated for student/research faculty opportunities at three facilities: 1) The Ohio State University Nuclear Laboratory (Columbus, Ohio); 2) Babcock & Wilcox (Portsmouth, Ohio); 3) Femi Nuclear Power Plant (Monroe, Michigan). Two faculty members (both underrepresented males) and six students (all underrepresented – 4 male, 2 female) participated. During the each of the visits to the research laboratories, students and faculty members toured the facilities and also conducted experiments on radiation of sample materials, cooling pools, and theoretical aspects of nuclear reactions. The students collected data for the sample radiation and power generation, then performed the analysis of the data and finalized reports. As a result, Wilberforce University and Babcock & Wilcox have signed a Memorandum of Understanding (MOU). The MOU provides for student internships, cooperative education, and employment opportunities for students, seminars/lectures/workshops at Wilberforce University by B&W staff. There is also a future opportunity for research collaboration.

All students who have received significant OSGC support and who have taken their “next step” have been successfully tracked.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty: (Educate and Engage)*

**OSGC FY2012 Goal 6 was met.**

**Goal 6** - To encourage and promote K-12 student interest in pursuing higher education STEM curricula by supporting the development of qualified STEM educators through scholarships and workshops, and provide access to NASA educational materials.

**Addresses NASA Outcome 2: Objectives 2.1, 2.3, 2.4**

**Addresses NASA Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

- Provided support for 15 pre-service teachers at a workshop held at OAI (February 15, 2013). Student participants received hands-on training and NASA education materials.

- Provided support for 8 teacher mini-grants for innovative teaching.

1. "Return to the Moon," Bishop John King Mussio Elementary (BJKM) (Susan R. Crites).
2. "NASA Student Launch Initiative," St. Vincent-St. Mary High School, (Robert J. Engels).
3. "Lake Campus Engineering and High School roBOTicS Collaborative Project," Wright State University - Lake Campus and Thurgood Marshall High School (P. Ruby Mawasha).
4. "Dayton's Best Students," Dayton Public Schools (Cassie Lee Marshall).
5. "All-American Soap Box Derby Gravity Race Challenge," North Canton Middle School (Todd D. Alkire).
6. "Math Game Group (MGG)," Lake Ridge Academy (Wade L. Zwinger).
7. "Mission to Mars/Science Olympiad," St. Pius X School (E. Catherine Ujvagi).
8. "Exploring Science in the Real World, Bettsville Local Schools (James M. Less). Note that Mr. Less is a former OSGC Education scholarship recipient (FY2010 and FY2009).

**Other Precollege Program support includes:**

- Sponsorship of the FIRST Buckeye Regional Robotics Competition – 59 high school teams (Ohio has 29 teams – 56 percent) with over 1,300 students from across the country competed in a robotics competition that combines sports with engineering and technology held at Cleveland State University Wolstein Center (March 28-30, 2013). [OSGC receives favorable publicity as a sponsor to this event (i.e., websites, signage, banners, and ads in Ohio newspapers.)] (URL: <http://oai.org/firstbuckeye/>)

- Provided travel support for iSPACE personnel, Beverly Ketron (female), Education Director to present and attend the 2012 Space Exploration Educators Conference (SEEC) at NASA Johnson Space Center for teacher professional development.

- Provided support for "Flight Camp at the University of Cincinnati for High School/Middle School" (Kelly Cohen) to provide an intensive exposure of aerospace, science, and engineering activities to urban middle and high school students as part of a STEM program aimed at opening opportunities for non-traditional students in the STEM fields who would not otherwise have access to in-depth courses of study, and careers for which they have the abilities, but little information or firsthand knowledge.

- Provided support for Ohio Northern University's Engineering Pathways Camp where high schools students spend 5 days on campus experiencing a variety of engineering activities led by Ohio Northern faculty in Ada, Ohio (June 17-22, 2012).

- Provided support for Miami University students to assist with the annual "Miami/



Talawanda Science Week” activities held in Oxford, Ohio (Week of May 14-18, 2012).

- Cedarville University (Robert Chasnov) hosted a pre-service teacher workshop for all Education and Science majors. Highlight of the annual program is a presentation by Bill Richey, Science Teacher at Xenia High School (also adjunct professor at Miami University) and Ohio Teacher of the Year along with other national teaching awards.

- Provided support for Ohio Northern University students and faculty to visit 3 middle schools in Ada, Ohio, to involve Grades 4, 5, and 6 in engineering activities.

**Outcome 3:** *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission (Engage and Inspire)*

**OSGC FY2012 Goal 7 and Specific and Measurable Objectives were exceeded.**

**Goal 7** - To encourage the development and focus of outreach programs, courses, teacher professional development, and research projects that align with current areas of emphasis within NASA priorities, as well as the needs of the State of Ohio.

**Addresses NASA Outcome 3: Objectives 3.1, 3.3**

**Addresses NASA Strategic Goal 6, Outcome 6.1, Objectives 6.1.1, 6.1.2; Outcome 6.2, Objective 6.2.1, Outcome 6.4, Objective 6.4.1**

- Participated in Ohio Aerospace Day in Columbus, Ohio (June 6, 2012).

- Provided support for “Science is Fun!” family days at Case Western Reserve University (Kathryn M. Kwiatkowski) impacting over 700 indirect participants.

- Awarded grant to the Cincinnati Observatory for “Astro Thursdays”.

- Provided support for Ohio Northern University’s Camp GEMS (Girls in Engineering, Math and Science) a 4-day campus experience for Grade 7 and 8 females to participate in Science, Engineering, and Math experiments led by Ohio Northern Engineering faculty and students. The camp is held on campus in Ada, Ohio (July 15-18, 2012).

- Sponsorship of “Science Olympiad” at Case Western Reserve University (Kathryn M. Kwiatkowski).

- Supported the 2012 Women in Engineering Camp at the University of Dayton (July 8-13, 2012) – a week-long, residential summer program that introduces high school females to career opportunities in engineering through classroom activities, hands-on experiments, industry visits, and exposure to engineers as role models.

- Cleveland Museum of African American History – permanent home of the “African Americans in Space Science Exhibit.”

- Drake Science Center in Cincinnati – conducts structured visits for teachers, students, and parents (over 20K students annually) in astronomy topics.

***Miscellaneous:***

- Published and disseminated two OSGC Newsletters. All OSGC newsletters are also available for viewing on the OSGC website at: <http://www.osgc.org/newsletters.html>

- Created and published *2012 OSGC Student Journal*. The *2012 OSGC Student Journal* (in PDF format) is also available for viewing on the OSGC website at: <http://www.osgc.org/studentjournals.html>

- Created and published *2012 OSGC Student Research Symposium Proceedings* – in an effort to reduce paper and be “green”, the Proceedings were produced as a CD. The *2012*

*OSGC Student Research Symposium Proceedings* (in PDF format) are also available for viewing on the OSGC website at: <http://www.osgc.org/symproceeding.html>

- Updated the annual *OSGC Congressional Book* – which details all OSGC scholarship and fellowship award, mini- and seed grants since the inception of the program and are broken out by the current Ohio 16 Congressional Districts.

- OSGC was recognized at a Lorain County Community College (LCCC) Board of Directors' Meeting by Dr. Roy Church, President, for supporting LCCC and especially the LCCC Rocket Team (September 27, 2012). Laura Stacko, OSGC Program Manager, represented the OSGC at this event.

- Worked with Ohio Space Grant affiliates to submit two proposals for the NASA Space Grant Innovative Pilot in STEM Education in both categories:

- 1) "A Model for Using Divergent Thinking, Creativity, and Synergy to Transform STEM Education," Kelly Cohen, Principal Investigator, for Effective K-12 STEM Teacher Education; 2) "The Ohio Space Grant Consortium STEM Alliance," P. Ruby Mawasha, Principal Investigator, for Undergraduate STEM Education.

## **PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES**

- **Student Data and Longitudinal Tracking:**

Total Awards	=	117*
Fellowship/Scholarship/	=	95
Higher Education	=	13
Research Infrastructure	=	9

**Total Underrepresented = 29.06% (34 students) Exceeds target!**

**Total Females = 35.90% (42 students) Did not meet target!**

In FY2012, of the total 117 student awards [in FY2011, the total was 137; decrease of 20 awards], the total of participating underrepresented students was 29.06% [in FY2011, the total was 32 (23.36%); increase of 5.70%] which exceeded the OSGC's target of 20% and the National Center for Education Statistics (Table 239) target of 18.31%. The total of participating female students was 42 (35.90%) [in FY2011, the total was 56 (40.88%); decrease of 4.98%] which did not meet the NASA target of 40%. This was due to the absence of Augmentation funding where planned additional Senior scholarship awards were to be reserved for women and underrepresented minorities.

In FY2012, for the 117 total awards, tracking information thus far indicates that 22 students have graduated and are pursuing advanced STEM degrees, 20 are employed in STEM positions in an aerospace industry, 7 are employed in STEM (non-aerospace position), 3 are employed in K-12 STEM Academic Field. The remaining 65 students are still in school completing their degree requirements. Other tracking information will be provided upon evaluation of completed of Student Exit forms. Note these numbers may be revised when additional reporting information is collected.

- **Minority-Serving Institution Collaborations:** The OSGC currently has two universities designated as Minority Serving Institutions (MSIs)/Historically Black Colleges and Universities (HBCUs): Central State University (CSU) and Wilberforce University (WU). Both of these institutions are federally recognized as Historically Black Colleges and Universities (HBCUs). Both CSU and WU are charter affiliate members of the OSGC. Five OSGC scholarships are awarded to STEM students at each of the two universities. Neither of the two universities has a graduate-degree program; however, students who attend graduate school at other affiliates are strongly encouraged to apply for OSGC fellowships.
  - Both HBCUs (Wilberforce University and Central State University) collaborated for student/research faculty opportunities at three facilities: 1) The Ohio State University Nuclear Laboratory (Columbus, OH); 2) Babcock & Wilcox (Portsmouth, OH); 3) Femi Nuclear Power Plant (Monroe, MI). During the each of the visits to the research laboratories, students and faculty members toured the facilities and also conducted experiments on radiation of sample materials, cooling pools, and theoretical aspects of nuclear reactions. The students collected data for the sample radiation and power generation, then performed the analysis of the data and finalized reports.
  - Create and fund student interns from an HBCU to work with a research faculty at an Ohio university. Two students have been selected as interns (one underrepresented male from Central State University (HBCU) and one underrepresented male from Wilberforce University (HBCU) to work with two identified research faculty members at The Ohio State University in Summer, 2013. Each student will receive a unique research experience in their chosen STEM field, but upon successful completion, each student's experience may likely lead to eventual enrollment in graduate school at the Ohio-based academic institution.
  - OSGC offers one special minority fellowship award annually, and although not a requirement of the award, both HBCUs (Wilberforce University and Central State University) have students who are made aware of the opportunity and are encouraged to apply.
  - OSGC has been an annual co-sponsor of the HBCU (Historically Black Colleges and Universities/OMI (Other Minority Institutions) Collaboration held either in Cleveland or Dayton, Ohio, but NASA NASA Glenn Research Center elected not to hold a conference in Summer, 2012.

Other OSGC MSI initiatives include:

- Wilberforce University is collaborating with The Ohio State University on Phase II of the “Nuclear Power for Space Colonization Research and Technology Development” for the Ralph Steckler Opportunity.

- **NASA Education Priorities:**

- Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused

questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

OSGC supported the following 2 students (1 underrepresented male) as participants in the NASA Aeronautics Academy at Glenn Research Center and travel during Summer, 2012: Nathaniel J. Morris (underrepresented male), 2012 graduate, Central State University and Dennis J. Siedlack, Graduate Student, Case Western Reserve University. Other supported students (stipend and travel) at NASA Centers include: Andrew K. DeSomma, Junior, The Ohio State University, at NASA Marshall Space Flight Center, Eric Lee Moyer, Senior, The Ohio State University, at NASA Ames Research Center, Alec J. Weisman, Junior, Baldwin Wallace University, at NASA Langley Research Center. Other supported students with industry internships (stipend and travel) include: Kristen G. Crum (female), Senior, University of Dayton, at Cornerstone Research Group; Kevin J. Pataki, Senior, The University of Toledo, at Orbital Research Group, Inc. (new industry partner in FY2012). In Spring, 2013, OSGC provided an internship (stipend and travel) to AnaPatricia Marquez (underrepresented female), Junior, The University of Toledo, at NASA Johnson Space Center.

Other student-led hands-on experiences include:

- Provided support for the “Rocket Team at the University of Cincinnati (UC)” (Grant W. Schaffner). The UC team competed in the Regional Space Grant Consortia Rocket Competition in Milwaukee, Wisconsin (April 27-28, 2012), and took first place honors in the Engineering category. The competition is a joint Consortia effort with the Great Midwest Space Grant Consortia spearheaded by the Wisconsin Space Grant Consortium. Plans are to support the team in the 2013 competition.
- Provided support for the “Rocket Competition Program,” at Lorain County Community College (LCCC), (Marlin Linger). The LCCC team also competed in the Regional Space Grant Consortia Rocket Competition in Milwaukee, Wisconsin (April 27-28, 2012), and took first place honors in the Non-Engineering category. The competition is a joint Consortia effort with the Great Midwest Space Grant Consortia spearheaded by the Wisconsin Space Grant Consortium. Plans are to support the team in the 2013 competition.
- Provided support to Ohio University for “Accuracy of a New Mechanical Response Tissue Analysis (MRTA) Device” (Patricia Arnold).
- Provided support to Case Western Reserve University for “Proposed High Altitude Microgravity Experiment (PHAME)” (Dennis J. Siedlack and Jaikrishnan R. Kadambi).
- Provided support to The University of Akron for “Radio Frequency-Powered Wireless Sensor Network” (Courtney Gras).
- Provided support to the University of Cincinnati Aircraft Design Team for the design of a transport type airplane with the goal of lifting the most weight possible (John W. Livingston).
- Provided support for 2 student NASA Lunabotics Competition teams at: 1) The University of Akron (Thomas T. Hartley); Miami University (Harry A. Pierson).

- Supported Miami University team of 33 students (12 females; 21 males; 3 underrepresented) for "Project High Flight" (Robert J. Setlock).
- Provided travel support for 3 University of Cincinnati students to present their research entitled: Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA)" at the 2013 National Space Grant Directors' Spring Meeting in Crystal City, Virginia. This was the first time Ohio students were featured at a National Space Grant meeting.
- Supported students from Case Western Reserve University and Cleveland State University who participated in "NASA's Technology Days" in Cleveland, Ohio (November 28–30, 2012). This three-day event and technology showcase will bring together a broad community of stakeholders from industry, academia, and the U.S. government to engage in strategy development, partnership building, and implementation of ways to foster technology transfer and innovation.
- Continue to support student-led balloon satellite/rocketry programs at: Central State University (HBCU), The University of Akron, University of Cincinnati, and Wright State University. Miami University received an OSGC grant for Project High Flight led by Professor Robert Setlock. The LCCC received an OSGC grant to form a Rocket Team led by Professor Marlin Linger to construct a rocket and be ready to compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, WI (April 27, 2013). The University of Cincinnati Rocket team will also compete in the Regional Space Grant Consortia Rocket Competition in Kansasville, WI (April 27, 2013).
- Diversity of institutions, faculty, and student participants (gender, underrepresented, underserved).

Institutions – The OSGC represents many diverse institutions across the State of Ohio in the execution of its programs including universities (2 Minority Serving Institutions which include Central State University (HBCU) and Wilberforce University (HBCU) which holds the distinction of being the oldest HBCU in the United States), colleges, community colleges, Government agencies, and education outreach partners. The Ohio Aerospace Institute (OAI) is the lead institution (501 (c) (3) non-profit organization located in Cleveland and is an active participating OSGC member providing financial support (\$105,000 in support of scholarships and fellowships) and supplementary support as part of the required match.

Faculty – There is an individual who serves as the Campus Representative at each of the 25 OSGC member institutions. Dr. P. Ruby Mawasha, who serves as the Associate Director of the OSGC is also as the campus representative at Wright State (Associate Director included in Campus Representatives' total) from Ohio colleges, universities, community colleges, and 1 representative from Ohio Aerospace Institute, the lead institution). Diversity for the OSGC membership includes 7 underrepresented members (25.93%) and 7 female members (25.93%). Fifteen (15) universities (Affiliate Members) comprise the OSGC Executive Committee (12 are from the original Ohio universities with Colleges of Engineering)]. Diversity for the OSGC Executive Committee includes 5 underrepresented members (31.25%) and 3 female

members (18.75%). Dr. P. Ruby Mawasha (underrepresented male) was appointed as Associate Director of the OSGC in October, 2012, and replaced Dr. Gerald T. Noel, Sr., former Associate Director, who passed away in April, 2012. In addition, the Ohio Aerospace Institute representative and OSGC Program Manager are both females.

Students – Of the total 117 student awards, the total of participating Underrepresented students was 34 (29.06%) which exceeded the OSGC's target of 20% and the National Center for Education Statistics (Table 239) target of 18.31%. The total of participating female students was 42 (35.90%) which did not meet OSGC's target of 40%. This reduction was due to the absence of Augmentation funding where planned additional Senior scholarship awards were to be reserved for women and underrepresented minorities.

- Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines (see above).
- Continued support through the OSGC research grant awarded to Ohio University, Ryan L. Fogt, "Antarctic Climate Change Education through Meteorological Measurements at Schools (ACCEMMS)", has enhanced Earth Science Education at 6 Ohio middle schools (focus on Grades 7-8), and particularly Antarctic Climate Change, through hands-on measurements. Operational weather stations have been installed and all the teachers have been trained on GLOBE protocol and the use of their weather station for in-class education. Curricular materials have also been provided that both teachers and students can use to enhance their education/learning/instruction.
- Provided support for iSPACE personnel, Beverly Ketron (female), Education Director, to present and attend the 2012 Space Exploration Educators Conference (SEEC) at NASA Johnson Space Center for teacher professional development.
- Provided support for "Flight Camp at the University of Cincinnati for High School/Middle School" (Kelly Cohen) to provide an intensive exposure of aerospace, science, and engineering activities to urban middle and high school students
- Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.
- Provided support for Ohio Northern University's Camp GEMS (Girls in Engineering, Math and Science) a 4-day campus experience for Grade 7 and 8 females to participate in Science, Engineering, and Math experiments led by Ohio Northern Engineering faculty and students. The camp is held on campus in Ada, Ohio (July 15-18, 2012).
- Provided support for Ohio Northern University's Engineering Pathways Camp where high schools students spend 5 days on campus experiencing a variety of engineering activities led by Ohio Northern faculty in Ada, Ohio (June 17-22, 2012).
- Supported the Women in Engineering Camp at the University of Dayton – a week-long, residential summer program that introduces high school females to

- career opportunities in engineering through classroom activities, hands-on experiments, industry visits, and exposure to engineers
- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.
  - FY2011, four scholarships were awarded (3 in FY2012). Two of the students from FY2012 will be completing their degree requirements for an Associate Degree and plan to attend OSGC-member universities (i.e., The Ohio State University and Wright State University) where they plan to continue their STEM education and apply for other NASA and OSGC opportunities.
  - For the first time in OSGC history, a curriculum grant was awarded to Lorain County Community College to develop a new course in Aerospace.
  - Continued support was provided to Lorain County Community College (LCCC) Rocket team and travel funds for the team to compete in the Great Midwest Regional Rocket Competition held in Milwaukee, Wisconsin (April, 2012). The LCCC Rocket team took first place honors in the Non-Engineering Category at the competitor.
  - Aeronautics research – research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).
  - Continued research with OSGC funding by Dr. Kelly Cohen at the University of Cincinnati – SIERRA Project. The following University of Cincinnati Aerospace Engineering students working on Aeronautics research on the following projects: Adam R. Gerlach, “Trajectory Tracking by Approximate Inverse Dynamics”; Nicholas S. Heeb, “Azimuthally Varied Noise Reduction Technologies for Supersonic Jet Noise Reduction”; Krista Kirievich, “Turbomachinery CFD Methods for Compressor Off-Design Modeling”; Owen B. R. Macmann, “Using Fuzzy Logic to Solve Sudoku Puzzles”; Sophia M. Mitchell, “Comparison of Fuzzy Optimization and “Genetic Fuzzy Methods in Solving a Modified Traveling Salesman Problem”; Alex R. Walker. OSGC also supported both Nathaniel J. Morris (underrepresented male) and Dennis J. Siedlack NASA Aeronautics Academy at Glenn Research Center.
  - Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.
  - Continuing support to Ohio University, Ryan L. Fogt, “Antarctic Climate Change Education through Meteorological Measurements at Schools (ACCEMMS)” and also at The University of Toledo, “Inspiring Student Science Interest Through Real-World Climate Change Projects,” Kevin P. Czajkowski.
  - Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.
  - The OSGC Seed Grant Program supports young faculty at Ohio universities and colleges that support and integrate research and education for faculty and post-doctoral researchers within the State of Ohio through collaborations between universities and with NASA Centers, OSGC affiliates, the State of Ohio, the Ohio Aerospace Institute, the Air Force Research Laboratory, and STEM-related industry with the ultimate result to enable them to strongly compete for substantial national awards. OSGC will specifically encourage proposals from

underrepresented and female faculty. Following are the types of grants offered: **Faculty Research Initiation Grant Proposal (FRIGP)** - is specifically meant as "seed funding" for untenured faculty to support new, innovative research to provide necessary results for a regular research grant opportunity with a funding agency such as NASA, NSF; **Curriculum Innovation Proposal (CIP)** - to support new, innovation curriculum development to support the development of STEM higher education in areas supported by NASA. Curriculum developments that that can be shared with other schools are especially preferred; **Student-Innovative-Creative-Hands-on Project (SICHOP)** - to aid in funding for undergraduate student "hands-on" projects. This can be an individual or a group project. A faculty mentor is required.

#### **Additional:**

Worked with Ohio Space Grant affiliates to submit two proposals for the NASA Space Grant Innovative Pilot in STEM Education in both categories. Final proposals were submitted to NASA Headquarters in December, 2012.

1) "A Model for Using Divergent Thinking, Creativity, and Synergy to Transform STEM Education," Kelly Cohen, Principal Investigator, submitted for the **Effective K-12 STEM Teacher Education** category.

2) "The Ohio Space Grant Consortium STEM Alliance," P. Ruby Mawasha, Principal Investigator, submitted for the **Undergraduate STEM Education** category.

#### **IMPROVEMENTS MADE IN THE PAST YEAR**

- Kent State University was added as a new OSGC affiliate in FY2012, and Dr. Gerald O. Thompkins was named as the Campus Representative. Although Kent joined the OSGC after scholarships had already been awarded, OSGC worked with Dr. Thompkins to recruit students and award one Senior scholarship and one Pre-Service Teacher (Education) scholarship award. Fellowship applications were also submitted for the FY2013 award competition (additional information provided below).
- Dr. P. Ruby Mawasha was named as the new OSGC Associate Director to replace Dr. Gerald T. Noel, Sr., who passed away suddenly in April, 2012. Dr. Mawasha is currently Assistant Dean and Director of Lake Campus Engineering, College of Engineering and Computer Science, at Wright State University (WSU). Dr. Mawasha also serves as the WSU Campus Representative and member of the OSGC Executive Committee with full voting rights.
- A new Campus Representative and member of the OSGC Executive Committee with full voting rights was appointed at Central State University. Mr. Clark Fuller replaced Dr. Gerald T. Noel, Sr. Mr. Fuller is Associate Director, Office of Sponsored Programs and Research.
- A new Campus Representative and member of the OSGC Executive Committee with full voting rights was appointed at the University of Cincinnati. Dr. Kelly Cohen replaced Dr. Gary L. Slater, to continue in his role as OSGC Director. Dr. Cohen is Associate Professor of Aerospace Engineering, School of Aerospace Systems, College of Engineering and Applied Science.



- A new Campus Representative was named at Kent State University (New Affiliate in FY2012). Dr. Gerald O. Thompkins is Director of STEM Research and Education Center, College of Arts and Sciences, Colleges of Education, Health and Human Services. Dr. Thompkins was formerly a member of the Michigan Space Grant Consortium representing Wayne State University.
- A new Campus Representative was named at Cuyahoga Community College, Mr. David Frazee, Associate Dean of Health Careers and Science. Dean Frazee replaced Dr. Donna Moore-Ramsey who retired in 2012.
- A new Campus Representative was named at Lakeland Community College, Dr. Margaret F. Bartow is Executive Vice President and Provost and Dean of Faculty. Dr. Bartow replaced Dr. Frederick W. Law who retired in 2012.
- A new Campus Representative was named at Owens Community College, Dr. Renay Scott is Provost. Dr. Scott replaced Ms. Tamara Williams who has assumed other responsibilities at Owens Community College.
- A new Campus Representative was named at Sinclair Community College, Mr. Kent Wingate is the Chairman of the Aviation Department. Mr. Wingate replaced Dr. Roger W. Abernathy who resigned as Dean to return to academia.
- For the first time, OSGC supported three students from the University of Cincinnati, Bryan Brown, Kevin Davis, and Andrew Puterbaugh, under the direction of Dr. Kelly Cohen, to present “Surveillance for Intelligent Emergency Response Robotic Aircraft (SIERRA)” at the 2013 National Space Grant Directors’ Spring Meeting in Crystal City, Virginia. Their presentation was broadcasted as a live webcast on NASA’s DLIInfo Channel. OSGC advertised this opportunity on the website and through social media (i.e., facebook and Twitter).
- Former OSGC scholarship recipients served as evaluators for the annual Student Research Symposium (i.e., Civil Servants from NASA Glenn Research Center).
- The OSGC Director created and distributed quarterly Director eNewsletters to OSGC affiliates via email.
- Two OSGC newsletters were created and distributed to OSGC listings and also posted on the OSGC website.
- OSGC worked with the OAI’s webmaster to update the OSGC website. A new, fresher OSGC website was rolled out which is easier to navigate and more user-friendly. The changes made it easier for the webmaster to maintain the navigation menus and the overall website resulting in time and cost savings. The OSGC website is maintained by the lead institution who provides the webmaster’s time as cost share.
- Revised the OSGC Fellowship evaluation procedure whereby all of the applications were downloaded to a secure site where the evaluators (15 members of the OSGC Executive Committee) could view applications electronically. In the past, multiple hard copies were produced and mailed out individually. The new procedure saved time, copier and mailing costs, and made it easier for the evaluators to view applications electronically.
- Awarded 3 community college scholarships at Sinclair Community College (new affiliate in FY2011). Two of the students from FY2012 will be completing their degree requirements for an Associate Degree and plan to attend OSGC-member universities (i.e., The Ohio State University and Wright State University) where they

plan to continue their STEM education and apply for other NASA and OSGC opportunities.

- For the first time in OSGC history, awarded a curriculum grant to Lorain County Community College to develop a new course in Aerospace.
- A new industry partnership was formed with Orbital Research, Inc., and OSGC shared costs for the student's \$8,000 internship in Summer, 2012.
- A new education outreach partnership was formed in FY2012 with OH WOW! The Roger & Gloria Jones Children's Center for Science & Technology in Youngstown, Ohio, as the result of a former OSGC Education scholar's new role as the Center's Education Manager.
- The current OSGC Student Display was updated to include all OSGC program promotional materials (i.e., scholarship/fellowship application packages, Fact Sheets, Student Journal, Annual Research Proceedings. Additionally, there is an entire wall at the lead institution dedicated with photos of current scholarship and fellowship recipients.
- OSGC updated all of its grant forms (including the on-line forms) to ensure they were uniform to reflect NASA reporting [1) Faculty Research Initiation Grant Proposal (FRIGP); 2) Curriculum Innovation Proposal (CIP); 3) Student-Innovative-Creative-Hands-on Project (SICHOP); 4) Informal Education Innovation Proposal (IEIP). All grant application forms have been updated as well as grant information provided on the OSGC website, and all on-line grant forms.
- OSGC updated all of its reporting forms for grant recipients to mirror the NASA Office of Education Performance Measurement (OEPM) System Reporting forms and the annual reporting request for participant information to replace the former CMIS (Consortium Management Information System) forms (i.e., NASA Education Outcomes, gender, race, ethnicity, demographics, cost sharing, higher education course creation, publications, etc.) and to include the new grant categories listed in the bullet above). Individual Word template forms were updated for Research Infrastructure and Higher Education, Precollege, and Informal Education.
- Enhancements were made to the OSGC website to allow grant seekers to apply on-line, or have the option of submitting their application on-line as a single PDF file.
- Enhancements were made to the OSGC website to allow grant recipients to download the NASA Office of Education Performance Measurement (OEPM) System Reporting forms for each of the OSGC grant categories on-line, or have the option of submitting their final report on-line.
- Became more proficient using social media to promote NASA opportunities and OSGC events (i.e., facebook, Twitter). Joined Linkedin in an effort to become more engaged with other professional networks, students, faculty, and professionals.
- Updated OSGC list-servs to advertise NASA and other STEM opportunities (i.e., disseminate 1-2 opportunities weekly)

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The OSGC represents many diverse institutions across the State of Ohio in the execution of its programs including universities, (2 Minority Serving Institutions which include Central State University and Wilberforce University which holds the distinction of being the oldest

HBCU in the United States), colleges, community colleges, Government agencies, and education outreach partners. The Ohio Aerospace Institute (OAI) is the lead institution. (501 (c) (3) non-profit organization, located in Cleveland, where the OSGC Program offices are also located. OAI is an active participating OSGC member providing financial and supplementary support as part of the required match. OAI's mission is to build Ohio's aerospace economy through research and technology development, education and training, and collaboration and information exchange.

Dr. Gary L. Slater serves as the Director of the Ohio Space Grant Consortium and Chair of the OSGC Executive Committee and Professor Emeritus, School of Aerospace Systems, College of Engineering and Applied Science, at the University of Cincinnati. Dr. P. Ruby Mawasha, P.E. (underrepresented male) is the new Associate Director of the Ohio Space Grant Consortium and also serves as the OSGC Campus Representative at Wright State University, and Assistant Dean and Director of the Lake Campus Engineering, College of Engineering and Computer Science. Dr. Mawasha was appointed OSGC Associate Director in FY2012 after the sudden passing of Dr. Gerald T. Noel, Sr., in April, 2012. Ms. Laura A. Stacko (female) is the Program Manager, and Mr. Timothy M. Hale, student at Lorain County Community College, was hired in November, 2012, as the Interim Program Assistant while Ms. Arela B. Leidy recovers from a serious injury. Ms. Ann O. Heyward, Vice President of Research and Educational Programs serves as the OAI representative for the lead institution to the OSGC.

The OSGC currently has 27 members<sup>4</sup> [Director and 25 Campus Representatives (Associate Director included in Campus Representatives' total) from Ohio colleges, universities, community colleges, and 1 representative from Ohio Aerospace Institute, the lead institution). Diversity for the OSGC membership includes 7 underrepresented members (25.93%) and 7 female members (25.93%). Fifteen (15) universities (Affiliate Members) comprise the OSGC Executive Committee (12 are from the original Ohio universities with Colleges of Engineering)].<sup>5</sup> Diversity for the OSGC Executive Committee includes 5 underrepresented members (31.25%) and 3 female members (18.75%). Dr. P. Ruby Mawasha (underrepresented male) was appointed as Associate Director of the OSGC in October, 2012, and replaced Dr. Gerald T. Noel, Sr., former Associate Director, who passed away in April, 2012.<sup>6</sup> In addition, the Ohio Aerospace Institute representative and OSGC Program Manager are both females.

#### **Affiliate Members and OSGC Executive Committee Members (15):**

•Air Force Institute of Technology (AFIT) - (Federal Institution Ph.D. degree-granting university). AFIT is the Air Force's graduate school of engineering and management as well as its institution for technical professional continuing education. Dr. Jonathan T.

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<sup>4</sup> Kent State University was added as a new Participating Member in FY2012.

<sup>5</sup>Three universities were promoted to Affiliate Member status (Cedarville University in FY2007; Ohio Northern University in FY2008; Miami University in FY2011) as a result of a goal to increase OSGC membership and on the strength of their participation in and contributions to OSGC activities (other participating institutions may be considered for promotion to affiliate status based on performance and the availability of funding).

<sup>6</sup>Dr. P. Ruby Mawasha, P.E. (underrepresented male) replaced Dr. Gerald T. Noel, Sr. (underrepresented male) who served as the OSGC Associate Director until his unexpected death on April 1, 2012.

Black is an Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, and serves as the OSGC campus representative at AFIT and is a member of the OSGC Executive Committee with full voting rights.

•Case Western Reserve University - (Private Ph.D. degree-granting independent research university). Dr. Jaikrishnan R. Kadambi is Professor and Associate Chair, Mechanical and Aerospace Engineering, and serves as the OSGC campus representative at Case Western Reserve University and is a member of the OSGC Executive Committee with full voting rights.

•Cedarville University - (Private four-year degree-granting university). Dr. Robert Chasnov, P.E., is Senior Professor of Engineering and Associate Chair, and serves as the OSGC campus representative at Cedarville and is a member of the OSGC Executive Committee with full voting rights.

•Central State University – (Public Historically Black four-year degree-granting university). Mr. Clark Fuller (underrepresented male) is Associate Director, Office of Sponsored Programs and Research, and serves as the OSGC campus representative at Central State University and is a member of the OSGC Executive Committee with full voting rights. Mr. Fuller replaced Dr. Gerald T. Noel, Sr., former OSGC Associate Director and campus representative at Central State, and member of the OSGC Executive Committee, who passed away suddenly in April, 2012.

•Cleveland State University – (Public Ph.D. degree-granting research university). Dr. Pamela C. Charity-Leeke (underrepresented female) is Manager of Engineering Student Affairs and serves as the campus representative at Cleveland State and is a member of the OSGC Executive Committee with full voting rights.

•Miami University – (Public Ph.D. degree-granting research university). Dr. Tim Cameron is Professor and Chair of Mechanical and Manufacturing Engineering, and serves as the campus representative at Miami University and is a member of the OSGC Executive Committee with full voting rights. Miami University's status was upgraded to an Affiliate Member of the OSGC in FY2011.

•Ohio Northern University – (Private four-year degree-granting comprehensive university). Dr. Jed E. Marquart, P.E., is Professor of Mechanical Engineering and serves as the campus representative at Ohio Northern and is a member of the OSGC Executive Committee with full voting rights.

•The Ohio State University – (Public Ph.D. degree-granting research university and is currently the second largest university campus in the United States). Dr. Füsün Özgüner (female) is Professor and Graduate Studies Chair, Department of Electrical and Computer Engineering, and serves as the campus representative at Ohio State and is a member of the OSGC Executive Committee with full voting rights. Dr. Özgüner and Ohio State also host all of the OSGC Executive Committee meetings held in Dreese Laboratory.

•Ohio University – (Public Ph.D. degree-granting university holds the honor as the oldest university in Ohio and the Northwest Territory). Dr. Shawn Ostermann is Associate Dean for Research, Graduate Studies, and Planning in the Russ College of Engineering and Technology, and serves as the campus representative at Ohio University and is a member of the OSGC Executive Committee with full voting rights.

•The University of Akron – (Public Ph.D. degree-granting research university). Dr. Craig C. Menzemer is Associate Dean of Graduate Studies and Administration and Interim Associate Dean of Undergraduate Programs, College of Engineering, and serves as the campus representative at The University of Akron and is a member of the OSGC Executive Committee with full voting rights.

•University of Cincinnati – (Public Ph.D. degree-granting research university). Dr. Kelly Cohen, is Associate Professor of Aerospace Engineering, School of Aerospace Systems, College of Engineering and Applied Science, and serves as the campus representative at the University of Cincinnati and is a member of the OSGC Executive Committee with full voting rights. Dr. Cohen assumed the campus representative duties in FY2012 enabling Dr. Gary L. Slater to serve as the OSGC Director and Chair of the OSGC Executive Committee.

•University of Dayton – (Private Ph.D. degree-granting university). Dr. John G. Weber is Associate Dean, School of Engineering, and serves as the campus representative at the University of Dayton and is a member of the OSGC Executive Committee with full voting rights.

•The University of Toledo – (Public Ph.D. degree-granting research university). Dr. Lesley M. Berhan (underrepresented female) is Associate Professor of Mechanical, Industrial, and Manufacturing Engineering Department, and serves as the campus representative at The University of Toledo and is a member of the OSGC Executive Committee with full voting rights.

•Wilberforce University – (Private Historically Black four-year degree-granting university). Wilberforce University has the honor of being the first HBCU in the country! Dr. Edward A. Asikele (underrepresented male) is Chair, Engineering and Computer Science, and serves as the campus representative at Wilberforce University and member of the OSGC Executive Committee with full voting rights.

•Wright State University – (Public Ph.D. degree-granting comprehensive university). Dr. P. Ruby Mawasha, P.E. (underrepresented male) is the new Associate Director of the Ohio Space Grant Consortium and also serves as the OSGC Campus Representative at Wright State University, and Assistant Dean and Director of the Lake Campus Engineering, College of Engineering and Computer Science. Dr. Mawasha is also a member of the OSGC Executive Committee with full voting rights. Dr. Mawasha was appointed OSGC Associate Director in FY2012 after the sudden passing of Dr. Gerald T. Noel, Sr., in April, 2012.

### **Participating Institutions (3):**

•Kent State University – (Public Ph.D. degree-granting research university). Dr. Gerald O. Thompkins is Director of STEM Research and Education Center, College of Arts and Sciences, College of Education, Health and Human Services, and serves as the campus representative at Kent State University. **Note that Kent State University was welcomed as a new member of the OSGC in FY2012.** Dr. Thompkins was formerly a member of the Michigan Space Grant Consortium representing Wayne State University, and the OSGC thanks Dr. Alec D. Gallimore, Director, Michigan Space Grant Consortium, and Ms. Bonnie L. Bryant, Program Manager, Michigan Space Grant Consortium, for referring Dr. Thompkins to the OSGC.

•Marietta College – (Private four-year degree-granting university). Professor Ben W. Ebenhack is an Associate Professor, Department of Petroleum Engineering and Geology, and serves as the campus representative at Marietta College.

•Youngstown State University – (Public Ph.D. degree-granting urban university). Dr. Hazel Marie (female) is Chairperson and Associate Professor, Mechanical and Industrial Engineering, and serves as the campus representative at Youngstown State University. Dr. Marie was a former OSGC fellowship recipient from The University of Akron where she received her Doctoral Degree in Mechanical Engineering.

### **Minority Serving Institutions (MSIs) (2):**

Ohio holds the honor of having the nation's oldest private, historically black university named to honor the great 18th century abolitionist, William Wilberforce—hence the founding of Wilberforce University. Central State University is Ohio's only public MSI. Central State University and Wilberforce University are Minority Serving Institutions (MSIs) and both are active members of the OSGC and voting members on the Executive Committee.

### **Community Colleges (7):**

•Columbus State Community College – (Associate degree-granting community college). Mr. Jeffery M. Woodson (underrepresented male) is Professor, Engineering Technologies Department, and serves as the OSGC campus representative at Columbus State Community College.

•Cuyahoga Community College (Tri-C) – (Associate degree-granting community college). Dean David Frazee is the Associate Dean of Health Careers and Science, and serves as the OSGC campus representative at Cuyahoga Community College. Tri-C is the oldest and largest community college in Ohio. Dean Frazee replaced Dr. Donna Moore-Ramsey who retired in 2012.

•Lakeland Community College – (Associate degree-granting community college). Dr. Margaret F. Bartow (female) is Executive Vice President and Provost and Dean of Faculty, and serves as the OSGC campus representative at Lakeland Community College. Dr. Bartow replaced Dr. Frederick W. Law who retired in 2012.

•Lorain County Community College – (Associate degree-granting community college). Dr. George Pillainayagam is Engineering Program Director, and serves as the OSGC campus representative at Lorain County Community College.

•Owens Community College – (Associate degree-granting community college). Dr. Renay Scott is Provost, and serves as the OSGC campus representative at Owens Community College. Dr. Scott replaced Ms. Tamara Williams who has assumed other responsibilities at the Owens Community College.

•Sinclair Community College – (Associate degree-granting community college). Professor Kent Wingate is the Chairman, Aviation Technology Department, and serves as the OSGC campus representative at Sinclair Community College. Professor Wingate replaced Dr. Roger W. Abernathy who resigned as Dean to return to academia.

•Terra Community College – (Associate degree-granting community college). Dr. James Bighouse is Associate Professor, Physics, and serves as the OSGC campus representative at Terra Community College.

•Government affiliates include the NASA Centers (especially Glenn Research Center), NASA CORE (Central Operation of Resources for Educators), NASA Aerospace Education Services Project (AESP), the Air Force Research Laboratory, Wright-Patterson Air Force Base Education Outreach, Ohio Board of Regents, State of Ohio Aerospace and Defense. NASA CORE is also a partner who assists the OSGC with teacher workshops and pre-service teacher scholarships (i.e., resources for teachers, students and NASA education materials). All the government affiliate representatives are very involved with the OSGC, attend meetings regularly, and work well with the Director and others.

•Industry partnerships include ArcelorMittal, Cornerstone Research Group, Inc. (CRG), Etegent Technologies, L-3 Cincinnati Electronics (CE), Sierra Lobo, ZIN Technologies. Orbital Research, Inc., was added as a new industry partner in FY2012. OSGC continues to improve membership in this area and is working with the lead institution, the State of Ohio, and others to add additional industry members.

•Education Outreach Partners include the Cincinnati Observatory Center, Cleveland Museum of Natural History, Drake Science Center, iSPACE, and informal educational partners throughout Ohio. OSGC has an ongoing presence at the Cleveland Museum of African American History. A new education outreach partnership was formed in FY2012 with OH WOW! The Roger & Gloria Jones Children's Center for Science & Technology in Youngstown, Ohio, as the result of a former OSGC Education scholar's new role as the Center's Education Manager. Many of the outreach affiliates receive OSGC mini-grants and seed grants for innovative STEM programs.

**The National Space Grant Office requires two annual reports, this Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**